# The irritable bowel severity scoring system: a simple method of monitoring irritable bowel syndrome and its progress

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## SUMMARY

*Background*: The clinical assessment and investigation of irritable bowel syndrome would be greatly facilitated by the introduction of a simple, easy to use severity scoring system. Such a system, developed in our department over a number of years, has been submitted to validation in a total of 141 patients and 40 healthy controls.

*Methods*: The system, incorporating pain, distension, bowel dysfunction and quality of life/global well-being, was assessed for its ability to reliably score patients previously classified as mild, moderate or severe. The reproducibility and sensitivity to change of the system was also assessed.

*Results*: The maximum achievable score was 500.

Mild, moderate and severe cases were indicated by scores of 75 to 175, 175 to 300 and $> 300$ respectively. Controls scored below 75 and patients scoring in this range can be considered to be in remission. There was a highly significant difference between controls and patients as a whole ($P = 0.0001$) as well as significant differences ($P < 0.01$) between all severity categories. Scores repeated within 24 h were very reproducible and sensitivity to change was also extremely good ($P < 0.001$) with a change of 50 reliably indicating improvement.

*Conclusion*: These results suggest that this scoring system should prove to be a valuable instrument in helping to meet the many challenges offered by irritable bowel syndrome.

## INTRODUCTION

Research into irritable bowel syndrome has always been hampered by a lack of standardization in terms of definition and severity of disease, making comparison between centres almost impossible. Progress towards some diagnostic uniformity has been achieved with systems such as the Manning[1] and Rome[2] criteria but so far, a simple scoring system has not been forthcoming.

If a widely acceptable scoring system could be introduced, it would be an invaluable tool in both the clinical and research setting. In the former, it could be used to monitor patient progress and in the latter would facilitate the recruitment of more homogeneous groups of patients or allow for treatments to be directed at patients of particular severity.

In the field of functional bowel disorders, a potential severity scoring system can either be designed for the individual syndromes or for the group as a whole. If the system is made too general, symptoms not occurring in different functional syndromes cannot be used. Furthermore, therapeutic research is usually directed at an individual disorder and therefore a system specific to that problem is desirable. To date, the only published severity index in the field has been directed at functional bowel disorders in general[3] rather than irritable bowel syndrome in particular. This index does not include, for instance, a question on bowel function when calculating the final score.

Over the years, we have been using a variety of

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questionnaires to help study the epidemiology, treatment and management of irritable bowel syndrome. This has resulted in a comprehensive questionnaire, including a severity score, which we now administer to all patients. However, with the passage of time, it became apparent that different facets of irritable bowel syndrome such as primary symptomatology, non-colonic features, quality of life issues and psychological factors, can change independently of each other. Thus the severity scoring component of our questionnaire has gradually been simplified until it contains just those five questions judged to be most relevant, including a unique bowel scoring system and a single global quality of life question. We have now subjected this final version of the scoring system to formal evaluation in our clinic, which has a unique blend of secondary and tertiary care patients, thus allowing us to test the scoring system across a particularly wide spectrum of disease severity. The results of this study are presented here.

## METHODS

### The questionnaire

The severity score questionnaire consists of 4 pages and is shown in Appendix 1.

The first page contains the usual demographic information, as well as instructions for the patient on how to use the questionnaire.

Page 2 contains the actual severity scoring questions with instructions on how to score them. Each of the five questions generate a maximum score of 100 using prompted visual analogue scales, leading to a total possible score of 500. Visual analogue scales have been shown to be a reliable method of recording symptom severity and the type of scores generated are preferred by many statisticians.[4–5]

Pages 3 and 4 list other therapeutic features felt to provide essential additional information, particularly for the trial field, but which are not used for scoring purposes.

### VALIDATION OF THE QUESTIONNAIRE

The questionnaire was administered to three separate groups of irritable bowel syndrome patients for the purposes of assessing (1) severity, (2) reproducibility and (3) sensitivity to change.

### Severity scoring

Sixty-one consecutive patients with irritable bowel syndrome attending the South Manchester University Hospital out-patient department were clinically classified as mild, moderate and severe and then given the severity score questionnaire to fill in at the time of their clinic attendance, so that their clinical rating could be correlated with their severity score. The division of patients into mild, moderate and severe was carried out by P.J.W. on purely clinical grounds without any reference to the severity scores which were independently collected on the same day by C.Y.F., who had no knowledge of the clinical rating. All patients fulfilled the Rome criteria. Forty randomly selected healthy controls without irritable bowel syndrome were also asked to complete the questionnaire.

### Reproducibility

A further group of 40 patients completed a severity score questionnaire at the time of their clinic attendance, and were then given a second questionnaire with instructions to complete it 6–24 h later, to be returned by post. At the time of completing the first questionnaire, all patients were unaware that they were going to be asked to repeat the exercise. Fifteen control subjects were also evaluated in a similar way. Six questionnaires were either not returned or failed to arrive within the time limit, giving an overall return rate of 85%. A further two questionnaires were inadequately completed.

### Sensitivity to change

For this aspect of the study, the severity score questionnaire was administered to another group of patients undergoing both conventional treatment and hypnotherapy for their irritable bowel syndrome. Hypnotherapy was selected as it was felt that it would be more likely to produce a group of subjects in whom substantial improvement might be expected. A severity score questionnaire was administered to 40 patients and repeated 3 months later at which time the clinician (P.J.W.) judged the patients as either little changed or substantially better, without any reference to their scores which were again collected and completed independently by C.Y.F. This resulted in a group of 19 patients exhibiting little

change and 17 showing substantial improvement (data were unavailable in the four remaining patients).

## STATISTICAL ANALYSIS

Severity scores for irritable bowel syndrome patients were found to follow a normal distribution. One-factor analysis of variance and Tukey's multiple comparison test were used to assess differences between the mild, moderate and severe subgroups.

Since severity index scores for controls were non-normally distributed (due to a high percentage of subjects with zero values, 22%), comparisons with the irritable bowel syndrome subgroups were carried out using the non-parametric Kruskal–Wallis test and Mann–Whitney U-tests with Bonferonni corrections.

Changes in severity scores for controls and irritable bowel syndrome patients were found to be normally distributed. Two-sample $t$-tests were used to compare severity scores of irritable bowel syndrome patients judged 'little changed' or 'considerably better'.

## RESULTS

### Demography

23% of the controls were male, compared to 22% of the irritable bowel syndrome group. This was not a significant difference. The mean age (range) of the controls was 35.1 years (19–62) compared to 43.7 years (22–72) for the irritable bowel syndrome patients. This difference was significant ($P < 0.01$). The data were also analysed to see if there was any association of score with age in either patients or controls—there was none. There were

Table 1. Severity scores for controls, and mild, moderate and severe irritable bowel syndrome patients

| | Mean (standard deviation) | Median | Range |
|---|---|---|---|
| Controls ($n = 40$) | 25 (25) | 15 | 0–79 |
| Mild IBS ($n = 10$) | 133 (33) | 142 | 91–179 |
| Moderate IBS ($n = 26$) | 243 (42) | 245 | 162–307 |
| Severe IBS ($n = 25$) | 372 (66) | 376 | 208–473 |

IBS = irritable bowel syndrome.

Table 2. Percentage of patients correctly classified in each group using different cut off points (in brackets)

| | Scoring system A | Scoring system B |
|---|---|---|
| Controls | 98% ($< 75$) | 98% ($< 75$) |
| Mild IBS | 90% ($75 - < 175$) | 90% ($75 - < 175$) |
| Moderate IBS | 88% ($175 - < 300$) | 65% ($175 - < 275$) |
| Severe IBS | 84% ($> 300$) | 92% ($> 275$) |

Table 3. Reproducibility within 24 h: Difference in severity scores at visit 2 minus visit 1

| | Mean | Interquartile range | Range |
|---|---|---|---|
| Controls ($n = 15$) | 2 | −4, 7 | −79, 96 |
| Mild IBS ($n = 7$) | 7 | −9, 22 | −43, 61 |
| Moderate IBS ($n = 11$) | 16 | −21, 61 | −97, 146 |
| Severe IBS ($n = 14$) | 13 | 0, 27 | −35, 58 |

no significant differences between any of the irritable bowel syndrome subgroups in terms of age or sex distribution.

### Severity scoring

Table 1 shows the severity scores obtained for mild ($n = 10$), moderate ($n = 26$) and severe ($n = 25$) irritable bowel syndrome compared to controls ($n = 40$). There was an overall highly significant difference between controls and the three irritable bowel syndrome groups ($P < 0.0001$). Furthermore, the irritable bowel syndrome subgroups were all significantly different from each other, as well as from the controls ($P < 0.01$).

Not surprisingly, there was some overlap between groups and a further analysis was undertaken using different severity score cut off points to determine the percentage of subjects correctly classified in each group. Table 2 shows the results of this analysis and it can be seen that the best results were obtained by taking $75 - < 175$ as indicating mild disease, $175 - < 300$ as moderate and $> 300$ as severe (Scoring system A).

### Reproducibility

Table 3 and Figure 1 show the difference in severity scores from repeated questionnaires filled in within 24 h.
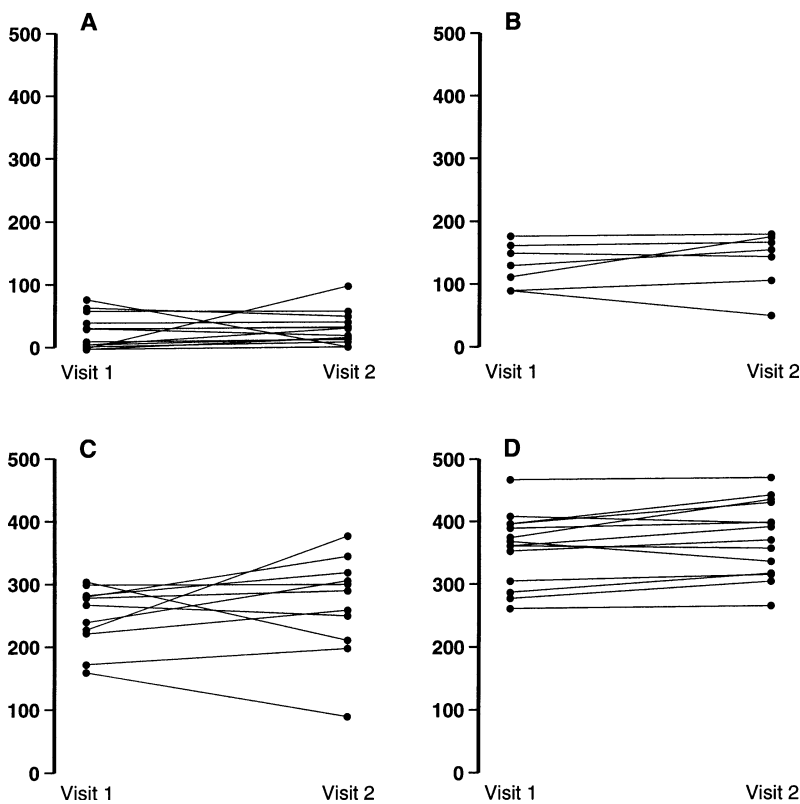
Figure 1. Reproducibility of scores within 24 h for controls (A), mild (B), moderate (C) and severe (D) irritable bowel syndrome patients.

Table 4. Sensitivity to change: mean (range) sensitivity score at baseline (visit 1) and 3 months later (visit 2) in 'little changed' and 'considerably better' groups

|  | Little changed | Considerably better | *P*-Value |
|---|---|---|---|
| Baseline score | 270 (152, 392) | 300 (164, 452) | *P* = 0.26 |
| Change in score (visit 1 − visit 2) | 6 (−107, 75) | 83 (11, 169) | *P* < 0.001 |

From the interquartile range, it is clear that repeat values were remarkably close although, as might be expected, there were a few patients in whom the difference was quite large. Thus reproducibility appears to be good.

*Sensitivity to change*

Table 4 and Figure 2 compare the severity scores of patients judged to be little changed or considerably better. It can be seen that although the baseline scores were not significantly different, in those who became considerably better there was a highly significant improvement in their severity score.

A further question that has to be asked is what degree of change in severity score best predicts a significant improvement. Table 5 shows the sensitivity, specificity and positive predictive value for severity score changes of 50, 100 and 150. It can be seen that a change of 50 was adequate to detect improvement.

### DISCUSSION

The results of this study indicate that the use of this scoring system produces a meaningful value that is reproducible and sensitive to change. It should be emphasized that this scoring system is specifically designed to assess the severity of irritable bowel syndrome in a patient at a particular point in time and is not intended to be used for initial diagnosis of the condition.

From the clinical standpoint, only the first page of the questionnaire needs to be used and the score is simple to calculate. The maximum score (500) is easily memorable and therefore the actual score can simply be jotted in the patient's notes at clinic visits. From the research point of view, the greater detail provided by the complete version of the questionnaire can be used for much more accurate classification of patients should this be required.

There is an obvious temptation to try and include the many facets of irritable bowel syndrome into a severity scoring system, but this is fraught with difficulties in such
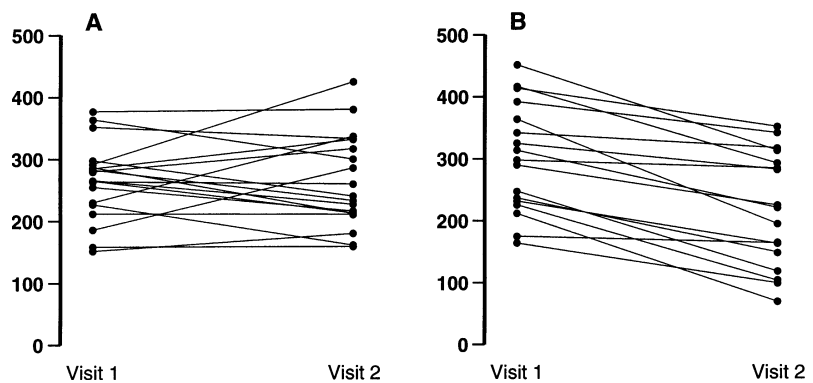
Figure 2. Change in scores for clinically unchanged (A) and improved (B) patients.

Table 5. Prediction of significant clinical improvement with change in severity score of 50, 100 and 150

| | Severity score change | | |
| --- | --- | --- | --- |
| | 50 | 100 | 150 |
| Sensitivity | 76% (13/17) | 35% (6/17) | 6% (1/17) |
| Specificity | 68% (13/19) | 100% (19/19) | 100% (19/19) |
| Positive predictive value | 68% (13/19) | 100% (6/6) | 100% (1/1) |

a condition where primary symptoms, non-colonic features, quality of life issues and psychological factors may not all be directly interrelated. For example, the routine inclusion of a general quality of life questionnaire into the total scoring system could confound the final score if quality of life is being affected by something other than irritable bowel syndrome. From a scoring point of view, it is inevitable that there will be some 'background noise' in any activity index which includes symptoms that might even occasionally be experienced by normal subjects. This was one reason why the sensitivity score questionnaire was also administered to a group of healthy controls. Normal subjects can score up to 75 and we recommend that a score below this level in patients with irritable bowel syndrome is taken as indicative of remission.

Our sensitivity score questionnaire has deliberately been kept simple and confined to five questions felt to be of particular value.

(i) *Pain*. The pain component of the questionnaire incorporates both severity and duration. The latter is assessed by asking the patient to recall the occurrence of pain over the preceding 10 days. This time frame was chosen as it is easy for the patient to recollect and simple to multiply by 10, resulting in a maximum score of 100. This is the same as the highest value for the severity score. Thus, the total pain score (severity and duration) carries a greater 'weighting' than the other questions.

This is in accord with the view that abdominal pain is probably the most important single symptom of irritable bowel syndrome, as well as being a good predictor of health status and the use of health care resources in irritable bowel syndrome and other functional gastro-intestinal disorders.[6–8]

(ii) *Distension*. Although distension is often ranked by patients as very intrusive,[9] it is generally felt to be a rather less common symptom in men than women. However, although men do not necessarily physically bloat to the same extent, we have found that they seem to perceive this feature of irritable bowel syndrome more as a feeling of abdominal tightness. Thus, if the words abdominal distension/tightness are combined when enquiring about this symptom, the difference between men and women is diminished. Nevertheless, as a further safeguard against distension contributing too heavily to the final score, it is given less weighting than pain.

(iii) *Bowel score*. It is our view that numerical values of bowel habit (visits to the toilet) have been grossly overused in the past and are extremely misleading. For instance, a patient reporting a higher number of visits to the toilet could be misclassified as having diarrhoea even though they are passing only small amounts of hard stool with straining. This patient is clearly constipated and an improvement would be reflected in a reduction in stool frequency, as opposed to a different patient with con-

stipation who is defecating only twice a week where an increase in stool frequency is desirable. We have always felt that the patient's degree of 'satisfaction' with a visit to the toilet is a much more accurate measure, improvement of which is therefore not dependent on an intricate enquiry about bowel habit, such as number of visits to the toilet and qualitative descriptions of stools. Furthermore, it also overcomes two other difficult problems associated with trying to quantify bowel dysfunction, i.e. defining what is a normal bowel habit and deciding what degree of change constitutes either an improvement or deterioration. Thus the severity scoring component of the questionnaire solely uses this bowel satisfaction system, although more detailed information about other bowel characteristics is still maintained in the questionnaire as a whole.

(iv) *Quality of life.* The last question seeks to combine global well-being and an overall view on quality of life as it relates specifically to irritable bowel syndrome, and overcomes some of the problems referred to earlier. It receives a similar weighting to questions 2 and 3.

Although included in earlier versions of our severity score questionnaire, we have subsequently deliberately omitted any form of psychological assessment from our questionnaire. This is because the psychological components were disproportionately contributing to the total score in some instances. We now use the Hospital Anxiety and Depression (HAD) inventory[10] on all our patients and recommend that for those clinicians wishing to monitor the psychological aspects of irritable bowel syndrome, such an instrument should be used in conjunction with the severity score questionnaire. This policy allows for the accumulation of much more meaningful psychological data, rather than this being lost in some form of total scoring system.

We believe that the scoring system described here should prove to be a very robust way of monitoring the severity of irritable bowel syndrome, as it is the final result of a slow process of evolution, constant refinement with time and has now been the subject of a careful validation. However, the real usefulness of any scoring system will only ultimately be known once it has been published, tested in the 'field' and found to make a significant contribution to either the clinical management of patients or the conduct of therapeutic trials. Furthermore its applicability to general practice patients where symptoms are often more intermittent will also need to be addressed.

## ACKNOWLEDGEMENT

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## APPENDIX 1   PATIENT SEVERITY SCORE QUESTIONNAIRE

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### IBS QUESTIONNAIRE

Name: _____   G.P. Name: _____

Address: _____   Address: _____

_____   _____

_____   _____

Telephone: _____   Telephone: _____

Date of birth: _____

Marital status: Single / Married / Divorced / Widowed / Co-Habit

Occupation: _____   Sex:   M    F

Ethnic background: Caucasion (white) / Afro-Carribean / Asian / Oriental

Fathers Occupation (even if retired): _____

### INSTRUCTIONS

This form is designed to enable us to record and monitor the severity of your IBS. It is to be expected that your symptoms might vary over time, so please try and answer the questions based on how you <u>currently</u> feel (ie over the last 10 days or so). All information will be kept in **strict** confidence.

1.   For questions where a number of different responses are a possibility please circle the response appropriate to you.

2.   Some questions will require you to write in an appropriate response.

3.   Some questions require you to put a cross on a line which enables us to judge the severity of a particular problem.

**For example:**

*How severe was your pain?*

*Please place your cross ( ✕ ) anywhere on the line between 0-100%
in order to indicate as accurately as possible the severity of your symptom.*

*This example shows a severity of approximately 90%.*

0% |————————————————✕—| 100%
no pain    not very    quite    severe    very
severe    severe    severe

1

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### PART 1 : SEVERITY SCORE

1.  a)  *Do you currently suffer from abdominal (tummy) pain?*    YES    NO
    *Circle appropriate box*

    b)  *If yes, how severe is your abdominal (tummy) pain?*

    0% |————————————————| 100%
    no pain    not very    quite    severe    very
    severe    severe    severe

    c)  *Please enter the number of days that you get the pain in every 10 days.*
    For example if you enter 4 it means that you get pain 4 out of 10 days. If you get pain every day enter 10

    Number of days with pain  [        ]    x10

2.  a)  *Do you currently suffer from abdominal distension**
    *(bloating, swollen or tight tummy)*    YES    NO
    *(*women, please ignore distension related to your periods)*    *Circle appropriate box*

    b)  *If yes, how severe is your abdominal distension/tightness*

    0% |————————————————| 100%
    no    not very    quite    severe    very
    distension    severe    severe    severe

3.  *How satisfied are you with your bowel habit?*

    0% |————————————————| 100%
    very    quite    unhappy    very
    happy    happy    unhappy

4.  *Please indicate with a cross on the line below how much your Irritable Bowel Syndrome is affecting or interfering with your life in general*

    0% |————————————————| 100%
    not at all    not much    quite    completely
    a lot

    **IBS SEVERITY SCORE:**  [   ]

2

*For office
use only*

*SCORE*

[   ]

[   ]

[   ]

[   ]

[   ]

## PART 2 : OTHER IBS DATA

**BOWEL HABIT**

5.   a)   *What is the most number of times you open your bowels per day/week/month?*

Number of times [    ] per day / week / month   *(Circle appropriate)*

*Note: For some people the answer to part a and b could be the same*

b)   *What is the least number of times you open your bowels per day/week/month?*

Number of times [    ] per day / week / month   *(Circle appropriate)*

6.   In the following questions you may circle more than one answer:

*Are your motions ever:*

a)   *normal*                                      often / occasionally / never   *(Circle appropriate)*

b)   *hard*                                        often / occasionally / never   *(Circle appropriate)*

c)   *very thin (like string)*                     often / occasionally / never   *(Circle appropriate)*

d)   *in small pieces (like rabbit pellets)*       often / occasionally / never   *(Circle appropriate)*

e)   *mushy (like porridge)*                       often / occasionally / never   *(Circle appropriate)*

f)   *watery*                                      often / occasionally / never   *(Circle appropriate)*

7.   In the following questions you may circle more than one answer:

*Do you ever:*                                                             *Circle appropriate box*

a)   *pass mucus (or slime or jelly) with your motions*                    [ YES ]   [ NO ]

b)   *pass blood with your motions*                                        [ YES ]   [ NO ]

c)   *have to hurry/rush to the toilet to open your bowels*                [ YES ]   [ NO ]

d)   *strain to open your bowels*                                          [ YES ]   [ NO ]

e)   *feel you haven't emptied your bowel completely
     after you have passed a motion*                                       [ YES ]   [ NO ]

3

## PART 2 : Continued

**SITE OF PAIN**

*Please mark with a cross (x) on the diagram below where you get your pain
(use more than one x if necessary)*



RIGHT
SIDE

LEFT
SIDE

8.   *Do you ever:*

a)   *notice your stools are more frequent or loose
     when you get pain*                                 [ YES ]   [ NO ]
                                                        *Circle appropriate box*

b)   *notice whether the pain is frequently eased
     by opening your bowels*                            [ YES ]   [ NO ]
                                                        *Circle appropriate box*

9.   *In the last year on approximately how many weeks were you:*

i)   *absent from work due to IBS*
     *(enter 52 if you have given up completely work because of IBS)*     _ _ _ _ _ _

ii)  *at work suffering from IBS*                                          _ _ _ _ _ _

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